Compliance patterns: harnessing value modeling and legal interpretation to manage regulatory conversations

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November 13, 2017

Abstract

Companies must be able to demonstrate that their way of doing business is compliant with relevant rules and regulations. However, the law often has open texture; it is generic and needs to be interpreted before it can be applied in a specific case. Entrepreneurs generally lack the expertise to engage in the regulatory conversations that make up this interpretation process. In particular for the application domain of technological startups, this leads to legal risks. This research seeks to develop a robust module for legal interpretation. We apply informal logic to bridge the gap between the principles of interpretation in legal theory with the legal rules that determine compliance of business processes. Accordingly, interpretive arguments characterized by argument schemes are applied to business models represented by value modeling (VDML). The specific outcome of the argumentation process (if any) is then summarized into a compliance pattern, in a *context-problem-solution* format. A case study from copyright law, about an internet television company, shows that the approach is able to express the legal arguments of the case, but is also understandable for the target audience.

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1 Introduction

Significant gains are being made within legal informatics and tools for legal knowledge management. As Susskind predicted [34], demonstrable results, for instance on time and cost savings from applying neural networks to legal discovery, have moved the legal domain quickly from reticence and ambivalence, to gradual adoption of these new techniques. These so-called deep learning techniques leverage a robust pattern-matching apparatus. However, they introduce a black box architecture which is not transparent for regulatory purposes. More work is needed to show how the governing rules were interpreted and applied for a given technology to be compliant.

This paper focuses on the application area of regulatory compliance. Companies need to be able to demonstrate that their business processes conform with relevant rules and regulations. A module for legal interpretation is a necessary component for any formal model or algorithm applied to regulatory compliance, see also [10]. This will help both regulators and companies understand what is happening and what can be done to correct unwanted behaviors. Tools to support legal interpretation will also have the potential to give those entrepreneurs who are unable to afford expensive legal consultants the possibility to (a) take their responsibilities in being compliant, and (b) exploit hitherto unforeseen business opportunities in the law. Compliance involves assessing the organization's business processes to see whether they conform to the law. However, the law may sometimes be open textured: designed to fit a number of scenarios [14]. That is why lawyers, judges and other legal officers engage in an interpretive process while applying legal rules which may in turn require legal argumentation to determine the prevailing interpretation in a particular instance. Black calls this regulatory conversations [4]. This may prove problematic especially for firms which leverage technology to innovate on areas which are yet to be legislated on, or for whose jurisprudence and case-law may not be as developed.

The objective is to explore the normative space governing a particular technology in order to make it accessible at the information architecture level where non-experts can identify and manage legal risks. This inspires a number of research questions below.

1. How to develop business models whose processes achieve their value while minimizing legal risks?

2. How to derive, maintain and analyze different interpretations that can be ascribed to a particular legal requirement?

3. How to reconcile conflicting interpretations of a given legal requirement?

4. How to apply a specific interpretation of a legal requirement to a business model, in order to manage a firm's compliance risks?

We address these questions by proposing a comprehensive approach to compliance, which should help firms manage their legal risks. The method is expected to help business owners investigate a business model's legal risks, select and interpret the relevant laws to understand how to handle those risks, and formulate common patterns that can be used to check the business model for compliance. The idea is to summarize knowledge and expertise about compliance of business processes in the form of so called *compliance patterns*, compare [25, 15]. Similar to design patterns [16], compliance patterns consist of a *context-problem-solution* structure.

While our approach for compliance may be applicable to all firms, in this research project we restrict ourselves to the application domain of startups. A startup is a company, partnership, or temporary organization designed to search for a repeatable, scalable business model that allows fo fast growth [5]. The proposal is illustrated by a case study about the application of copyright law to a live-stream internet television company, called TVCatchup (TVC). The purpose of the case is to show how the method works, and that it is useful and applicable for the target audience. It will become evident from the patterns developed that whether or not a firm should access the EU market instead of a smaller market, in this case the UK, is a simple question with a very complex legal answer but also depends on the available resources.

The remainder of the paper is structured as follows. Section 2 reviews related approaches and explains the method we propose. Section 3 explains the main proposal: compliance patterns. Section 4 contains the case study and Section 5 concludes and suggests some future work.

2 Background

Part of the reason for the fragmentation is the lack of a clear strategy on which context and domain to initiate the problem-solving. While the entrepreneur is concerned with the flow of value, the computer scientist is concerned with information flow and the lawyer with compliance. This calls for a strong interdisciplinary approach. A business-first approach aligns to the juristic conceptualization of the law where legal analysis begins with the facts of a given case or transaction. A similar approach has been developed in the privacy and security domain [13]. See also the EUCases project [6]. Further requirements were collected from a survey conducted on how startups handle legal risks. The responses showed that founders struggled to identify, interpret and incorporate the law into the decision-making process. On the other hand, lawyers struggled to understand the technology involved. The following requirements where developed for the conceptual framework:

- It is imperative to develop a compliance formulation method that is tailored for, and equally agile to the rapidly evolving business models in the startup domain and one that lawyers can understand.
- The module on legal interpretation needs to deliver a prescription that is actionable.
- The module on legal analysis needs to identify the risk and deliver clear and specific requirements tailored to manage it.

To do this, we will need to model the business and its activities. The legal rules will then be determined and any legal issues arising interpreted in order to determine the scope of compliant behavior. Next the interpretations are reconciled and the resulting prescriptions are formulated into patterns that describe how a business model can achieve compliance.

2.1 Related work

2.1.1 Traditional view of law

Legal informatics research continues to investigate the misalignment between business processes and the relevant legal rules that determine their compliance [33, 9]. Research in Requirements Engineering (RE) is more concerned with tackling ambiguities in elicited requirements [27, 12]. Work by Ghanavati et al. [17] shows how a closer collaboration of these developing domains could help manage the intricacies of, and handle the resulting interpretations. Such collaboration sets the stage for better definition of constraints for compliance as a non-functional requirement and thereby, more compliant software systems. However, we still need systematic methods to explore the solution space in terms of the possible interpretations that could result from applying a given legal provision.

2.1.2 Philosophical view of law

Formal models offer provable guarantees that the system will comply with the specified legal requirements. The power of ontological modeling has been applied to represent legal rules. However, legal ontologies are distinctive in that they are committed by concepts in legal theory. While a pragmatic rule-based approach has proved shallow, pure logic-based methods are also detached from the epistemological challenges in legal theory. It is instructive to appreciate that legal modeling transcends technological advancement and is an intricate blend of AI technology, legal theory, and knowledge engineering. It may be possible to synthesize these fields to help the law stand the pace of technological innovation.

2.1.3 An integrated approach

Our design of compliance integrates the analysis of value from the business and legal domains. Given that value analysis is a complex endeavor more so in interdisciplinary setting, we look to rigorous ontology-based conceptual modelling the core of artificial intelligence. We apply value modeling to avail of the elaborate mechanisms for measuring a startup's economic value and the value-at-risk. Similarly, our analysis of legal risk is informed by the ongoing conceptualization of value modeling based on foundational ontologies [20]. To maximise the degree of fit, we focus on the value ascription relationship between executives as agents, and compliance, as a value object. Given that *perceived value* of compliance is low among startups, we concentrate on the *theoretical value* of compliance. However, even with elaborate value modeling tools, it is challenging to estimate the legal risk. Courts and regulators have the power to escalate fines where they sense complacency or flagrancy. For instance, The UK Office of Communications (Ofcom) recently fined vodafone £4.65M for non compliance where previous fines were £250,000 against H3G and £1M against EE. Even then, some cues exist for estimating the risk e.g. where a defendant subsequently acquires a license after infringing a copyright, damages should not exceed double the amount payable under the license before the first infringement.

Our modeling of the interpretive process is also informed by the developing notion of relationship reification [20] which considers a relationship as an object that helps the relation to hold. This helps us specify the consecutive steps for the legal analysis from domain specification to argumentation and their individual qualities.

A successful representation of the ontological and conceptual modelling of the intepretive process sets the stage for formalization. [19] applies ruleML, defeasible and deontic logics to transform a contract from its implicit to its explicit form for a rule engine to monitor the contract performance at run time [citation]. Similarly, our approach can be incorporated as a module to derive possible interpretations in developing frameworks for a) for legal reasoning e.g. [32], b) the management of legal knowledge e.g. Eunomos [7] or c) for the acquisition and specification of legal requirements in RE e.g. Nomos 3 [23], Legal-URN [18] and FBRAM [11].

2.2 Business modeling

We adopt the notion of *economic value* as a unifying factor for all the stakeholders. This will help model the necessary scenarios showing possible tradeoffs for the success of the business model. The point is to model choices at the strategic level of decision making, not at an operational level. We expect that the value-based approach is a quick and effective way to model the firm's core business processes. It also helps to frame the research to address

business needs, and assure its practical relevance. Several approaches exist to value modelling. Osterwalder's Business Model Canvas is a succesful approach [30]. It is easy to apply, but its results are not precise enough for legal analysis. Gordijn's e3-value focuses on exchanges of value objects in a value network. The e3-value ontology is suitable in principle, but currently, e3-value lacks tools support. Now it is only a graphical notation; the ontology cannot be used for automated reasoning. Therefore, in this paper we have adopted Value Delivery Modeling Language (VDML) an official representation language supported by OMG [29]. VDML has elaborate notations for analysis and design of the operation of an enterprise and it has tool support. In particular we have used VDMBee[1].

We will use value models and tools to answer the first research question of modeling the business in order to understand how the technology developed is applied. These capabilities and activities are the inputs of the legal analysis.

2.3 Legal risk analysis

The second part elaborates on the interpretive process. We adopt argument schemes from informal logic to model the steps of this process as shown in section 3. This area of logic has been used to demonstrate how legal terms are defined by a sequence of argumentation moves in which, a given rule is refined by taking new exceptions and precedents into account. This approach is more intuitive and closer to legal reasoning and is therefore more likely to be appreciated by stakeholders from the legal fraternity. Mylopoulos et al. also use argumentation methods to refine goals [28]. In a similar vein, we apply the abstract argumentation schemes developed by Walton et al. [35] to generate and characterize the rule patterns that typify a particular legal domain. The resulting templates are then instantiated with the particulars of a given business model. A model for legal argumentation is then deployed to determine the overall winning interpretation. It is this final interpretation that is used to derive a common pattern summarizing the context, the legal problem, i.e. risk of non-compliance, and the proposed solution. We refer to this triple of *context-problem-solution* as a *compliance pattern*. It specifies compliant behavior for the business model and subsequent models based on that pattern.

Patterns have been used before to address compliance: [24, 25] uses patterns to prescibe controls in business models while [15] use patterns to specify compliance constraints on business processes. However, our work is novel, because it applies argumentation theory to capture the outcome of legal interpretation, tailored to a particular business model. The utility is in identifying and reusing existing patterns for analyzing compliance and even more importantly, for tracking regulatory changes.

[1] vdmbee.com

2.3.1 Eunomos

To identify the legal rules, we first classify the identified activities within the governing domain of law. A Legal Knowledge Management System (LKMS) could be incorporated at this stage. Boella et al [7] discuss Eunomos, a specific legal knowledge management system, that could act as a plug-in of a Business Process Management system, to handle multiple interpretations of norms. In Eunomos, the European Legal Taxonomy Syllabus ontology framework [2] has been extended to include prescriptive norms, as opposed to the terminological definitions found in constitutive norms, that are covered by most existing systems. Humphreys [21] and Humphreys et al [22] seek to address the resource bottleneck of populating ontologies by semi-automated extraction of constitutive norms (terminology) and prescriptive norms (legislative prescriptions) from the text of legislation, using Semantic Role Labeling (SRL).

Compliance patterns could further enhance search capabilities in Eunomos to help executives explore the legislation given a business model. Compliance officers may also find and update prescriptions affecting business models in case changes in the law. Diagnosis will also improve as executives will be enabled to find potential legal risks and assess their relative impact using a value management platform such as VDMBee. Most importantly, the patterns distill legal advice into system requirements. Some patterns will present alternatives from which executives can apply to manage outstanding risks.

2.3.2 Interpretation

To explore the possible interpretations to a legal rule, we look to legal theory. Legal doctrine embodies a number of principles from legal theory that are used in legal interpretation. Such principles, referred to as canons of interpretation, may at times be competing, thereby resulting in conflicting interpretations. In other instances, the interpretations could complement each other. Even then, one might have a reason to prefer one interpretation over another owing to the weight placed on one interpretive principle over the other [32]. Interpretations can take many thematic forms. Compare with [3] that concentrates arguments from reason in civil law jurisdictions. We apply the four themes and their accompanying eleven canons (types of arguments) identified by MacCormick et al [26]. Albeit ambitious, this study, by leading legal theorists representing their individual countries, was conducted for over a decade in an effort to demystify and reconcile the cross-jurisdictional differences on interpretation. They offer sufficient arguments for our purposes to identify, and a classification to map the nature of legal reasoning as follows:

a Linguistic arguments: argument from ordinary meaning, argument from technical meaning;

b Systemic arguments: argument from contextual harmonization, argument from precedent, argument from analogy, argument from a legal concept, argument from general principles, argument from history;

c Teleological-evaluative arguments: argument from purpose, argument from substantive reason; and

d Trans-categorical-arguments: argument from intention.

2.3.3 gap-filling

Sometimes, more may be demanded as the interpretive process is not always sufficient. [26] differentiate interpretation from gap-filling, which is necessary to remedy intrinsic and extrinsic gaps in legislation resulting from new forms of legal life for instance, in economic and technological regulations. In an ongoing case study, we are learning that where there is no issue for interpretation, it may be a case for gap-filling. The instance is a Nairobi startup BitPesa, which is using Bitcoin to conduct money remittance services. There is no regulatory framework in Kenya to handle cryptocurrencies. The framework may thus be limited to generating the arguments from intention that the legislature or judicial doctrine may have used to fill the resulting gaps.

2.3.4 Legal argumentation

To reconcile the resulting interpretations, we apply a simple but economical model interaction subsequently identified in [26]. The model's hierarchical order, the arguments and their respective categories rest upon and implement values of special significance in legal order as follows.

1. Consider arguments in the following order: 1. linguistic arguments, 2. systemic arguments, 3. teleological-evaluative arguments.

2. Accept as *prima facie* an interpretation at one level before proceeding to the next. At level (c) only accept the argument supported by the whole range of arguments.

3. Take account of arguments from intention and other trans-categorical arguments as grounds, which may be relevant for departing from the *prima facie* ordering.

2.3.5 EARS Framework

We adopt the Easy Approach to Requirements Syntax (EARS) framework from requirements engineering to the final prescription to clarify any legal

jargon and to present it in a accessible form to engineers. The general syntax is: ⟨ OPTIONAL PRECONDITIONS⟩ ⟨ OPTIONAL TRIGGER⟩ THE ⟨ SYSTEM NAME⟩ SHALL ⟨ SYSTEM RESPONSE⟩. It is expounded into six patterns as follows:

1. Ubiquitous requirements: Such a requirement has no preconditions or trigger. It is not invoked by an event detected at the system boundary or in response to a defined system state, but is always active.
2. Event-driven requirements: initiated only when a triggering event is detected at the system boundary.
3. Unwanted behavior: failures, disturbances, deviations, defined using a syntax derived from event-driven requirements designated by keywords 'If' and 'Then'.
4. State-driven requirements: active while the system is in a defined state. They are denoted by the keyword 'While'.
5. Optional features: designated with the keyword 'Where'.

Requirements with complex conditional clauses can be achieved by combinations of the keywords When, While and Where to specify richer system behaviors. They can also be used within If-Then statements

2.4 Compliance patterns

The final requirement is to manage the related legal risk using a *context-problem-solution* structure. The context is summarized by the technological competence and consequent activity driving the value model. The problem is described identifying the legal risk arising from a certain activity or competence of the model, and the solution is given by listing the final requirement.

3 Compliance Patterns Framework

We use a dialectical approach following Walton in order to indicate how legal arguments are developed in a legal dispute. Accordingly, the argumentation is divided into five stages of a dialogue namely, domain classification, confrontation, opening, argumentation and closing stages [35]. This helps to justify the winning argument, hence the winning interpretation. These stages will also serve to structure the rest of the framework.

3.1 Domain classification stage

This stage facilitates the classification of a value model within an appropriate domain with the legal framework from which the legal rules will be derived. It has two stages: value modeling then legal domain identification.

3.1.1 Value modeling

We apply the VDMBee value management methodology to describe the business; build a business network, a canvas, a strategy map and eventually the business plan on the VDMBee value management platform. This helps determine the competencies and activities driven by a startup's disruptive technology.

3.1.2 Legal domain identification

The resulting competencies and activities serve as evidential facts (EF) to determine which legal domain governing the value model. It is here that lawyers, in-house counsel or compliance officers would traditionally be engaged although the growing number of legal knowledge engineers will increasingly be playing this role. We apply Walton's argument from classification for the value model as below:

Argument from legal domain classification

1. Individual premise: VM has competence/activity EF.
2. Legal classification premise: for all x if x has competence/activity EF, then x ought to be regulated by legal domain D
3. Conclusion: VM is regulated by legal domain D.
4. The critical questions:
   (a) Does VM definitely have competence/activity EF, or is there room for doubt?
   (b) Can the legal domain classification be said to hold strongly, or is it subject to doubt?

3.2 Confrontation stage

This is where the conflict of opinion or problem is stated in a dialogue setting. We use this stage to characterize the legal research phase that lawyers conduct before a case is adjudicated. Walton applies abductive arguments for forward argument invention. We adopt this application to generate the prescriptive rules that define legal behavior and thereby help parties make their legal claim.

3.2.1 Prescriptive rule generation

We use Walton's prescriptive rule for legal obligation scheme to derive the prescriptive rules.

Forward argument for abductive rule identification

1. Domain Premise: EF is an competence/activity in VM
2. Rule premise: There's a set of legal rules PR1, PR2, ..., PRn that regulate EF.
3. Plausibility premise: PRi is the most plausible rule regulating EF.
4. Conclusion: Therefore EF should be compliant with PRi.
5. Critical questions:
   (a) How satisfactory is PRi itself as a rule regulating EF, apart from the alternative rules available in the dialogue?
   (b) How much better a rule is PRi than the alternative rules so far in the dialogue?
   (c) How far has the dialogue progressed? If the dialogue is an inquiry, how thorough has the search been in the investigation of the case?

3.3 Opening stage

Participants try to resolve the conflict or solve the problem using rational argument. In the legal domain this may involve proponents stating their case and respondents responding, which opens the way for further argumentation. The proponents are normally expected to state the rule, generalization or in legal theory terms, a normative conditional [5] for the case they allege has been violated. Here, legal claims are restated more precisely in terms of the prescriptive conditions identified from the foregoing stage.

3.3.1 Legal claim

We use one of Walton's argument schemes from rules [35] as follows:

Argument from legal claim

1. General rule premise: [Activity a] is restricted by a right belonging to X under [section].
2. Performance premise: To perform the [Activity a], an entity Y must:
   (a) own the right; or
   (b) be assigned to perform
   (c) be licensed to perform
3. Warrant: Y violates/infringes the right of X if it performs activity without authorization.
4. Conclusion: Therefore, Y must own or obtain the right to perform the activity.
5. Else: Y infringes the right of X.

3.3.2 Legal action

The legal action which invokes additional prescriptive rules to enforce the claim. For this we deploy Walton's argument scheme from established rule [35] as follows:

Argument from legal action

1. Established rule premise: Where a valid legal claim under [section] exists, X has a right to sue Y under [section]
2. Remedies premise: Y is potentially liable under [section] to X for: [damages, injunctions, account of profits, impounding and disposition of infringing articles, costs and attorney's fees or criminal offenses].
3. Violation premise: Y violates X's right under [section]
4. Conclusion: Therefore: Y is potentially liable to X for remedies

3.3.3 Exceptional case generation

A party can now confront the other side in order to force them to negotiate a fair settlement amicably or risk being sued. This places a burden of proof on the respondent who may then respond by either rebutting the foregoing conclusion or attacking one of its premises using a suitable rule. We use Walton's argument from exceptional case [35] to simulate how they can go about making their case.

Argument from exceptional case

1. Exception premise: If the case of [Ex] is an exception to the established rule under [section], the rule can be waived in that case.
2. The case cited is an exception.
3. Conclusion: Therefore, X is exempted from violation of Y's right under the established rule.
4. Critical questions:
   (a) Is the case of [Ex] a recognized type of exception?
   (b) If it is not a recognized case, can evidence that the established rule does not apply to it be given?
   (c) If it is a borderline case, can comparable cases be cited?

3.4 Legal interpretation

Participants may try further attempts to resolve the conflict. In law, this may involve out of court settlement, mediation, arbitration or a full fledged legal suit. Whichever the case, rules determined by the foregoing arguments need further examination so each party can determine the strength of its position.

3.4.1 Legal issue identification

Stating the prescriptive conditions helps determine the terms (T) to be interpreted and the legal issues arising thereof. The prescriptive rule will have a number of elements which legal theory refers to as operative facts (OF). These are abstracted from actual legal scenarios and case law to characterize compliant behavior. An operative fact may also be defined by a constitutive rule in the interpretation section of a statute. Even then, such meaning may at times be defeasible or open textured. This is not always unintended as the law is sometimes designed to capture multifaceted scenarios. Conventionally, a legal issue will be raised regarding the identified term. This takes the form of a question (Q), the answer to which helps determine the appropriate compliance behavior. The framing of Q sets off the interpretive process.

3.5 Argumentation stage

The identified term is interpreted in accordance with the legal question using a number of interpretive arguments.

3.5.1 Legal argument generation

We apply Walton's the forward abductive scheme [35] to generate the different arguments that could be made in favor, or against a given interpretation while interpreting a given term. The argumentation model is incorporated within this argument to reconcile the resulting interpretations.

Forward argument for abductive legal interpretation inference

1. Legal issue premise: PR(T) is open-textured/defeasible term, that requires interpretation to determine compliance of [VM].
2. Interpretive argument premise:
   (a) PR(T) may be interpreted by a set of canons [$C_{\text{Linguistic}}$, C_{Systemic}, $C_{\text{Teleological-evaluative}}$, $C_{\text{Trans-categorical}}$] supplemented by plausible conditionals and other statements that function as missing parts of enthymemes.
   (b) which lead to respective interpretations [$I_{\text{Linguistic}}$, I_{Systemic}, $I_{\text{Teleological-evaluative}}$, $I_{\text{Trans-categorical}}$].
3. Interpretive model premise: Unless there is a strong indication of a $C_{\text{Trans-categorical}}$ argument, then:
   (a) the most plausible/strongest canon Ci is represented:
      i. in the first instance by a $C_{\text{Linguistic}}$ argument unless a C_{Systemic} argument applies;
      ii. in the second instance by a C_{Systemic} argument unless a $C_{\text{Teleological-evaluative}}$ argument;

iii. in the third instance a $C_{\text{Teleological-evaluative}}$ argument;

(b) Else:

i. the most plausible/strongest argument is represented by a $C_{\text{Linguistic}}$ argument supported by any $C_{\text{Trans-categorical}}$ argument.

4. Conclusion: Then, the most plausible/strongest interpretation is:

(a) a $I_{\text{Linguistic}}$ interpretation supported by a $I_{\text{Trans-categorical}}$ interpretation

(b) Else:

i. a $I_{\text{Linguistic}}$ interpretation applies in the first instance;

ii. a I_{Systemic} interpretation applies in the second instance;

iii. a $I_{\text{Teleological-evaluative}}$ argument applies in the third instance.

3.6 Closing stage

Here, we determine the actual compliant behavior by applying the final interpretation to the prescriptive rule. This allows us to rewrite the rule in order to derive a prescription. The prescription should include all the accepted interpretations to reflect the possible options for compliance. We then apply the EARS framework to generate clear and unambiguous requirements for compliance.

4 Case study-TVCatchup

The running example is the second motivational case study from the doctoral thesis of the first author. Data for the case study was collected by means of a documentary review of publicly available documents. We also use original legal sources so the reasoning can be traced. TVC is a startup that operates an internet based live stream service of broadcast television programmes, including broadcasts and films in which a number of UK broadcasters i.e. ITV, Channel 4 and Channel 5 own the copyright. The said broadcasters sued TVC but it secured a defence by way of an exception to copyright infringement at the High Court. The Broadcasters appealed to the Court of Appeal and the case is yet to be determined awaiting a determination of a reference for interpretation by the Court of Justice of the European Union (CJEU). It is instructive that this is the second reference to the CJEU for interpretation, the first one having been made by the High Court. A number of issues were raised but we can only illustrate one sufficient to define a compliance pattern.

4.1 Domain classification

4.1.1 TVC Value Model

We applied the VDMBee value management methodology [1] to model the business with a*business model canvas* (BC), a business network collaboration

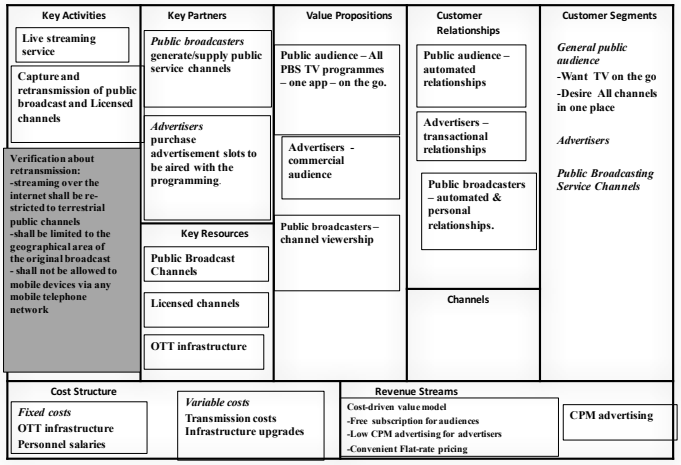

Figure 1: TVCatchup's business canvas

diagram, a *Strategy Map* (SM) and a business model built using the VDMbee platform. We restrict our discussion to the BC and SM for brevity. A BC facilitates the development of a common language that allows different stakeholders to understand how the business articulates its different components, how to align the activities to the firm's mission and vision, how to understand which actors are involved in which processes and for which value delivering and how to identify risks and failures. The BC related to our example is illustrated in Figure 1. The SM helps to abstract business transformation Figure (2). It identifies causal relationships between goals; The SM built before legal analysis does not include the legal risk management layer.

4.2 Confrontation Stage

The Court of Appeal has already identified the the relevant domain as broadcast copyright and film copyright. It has also identified the relevant prescriptive rule as s.20(1)(b) and s.20(1)(c) of the Copyright, Designs, and Patents Act 1988 (CDPA), for conciseness, we proceed to the opening stage.

4.3 Opening Stage

4.3.1 legal claim

The broadcasters claimed TVC Infringed their copyright in film and broadcasts by communicating these works to the public contrary to the identified rule. The framework's *argument from legal claim* is applied as follows:

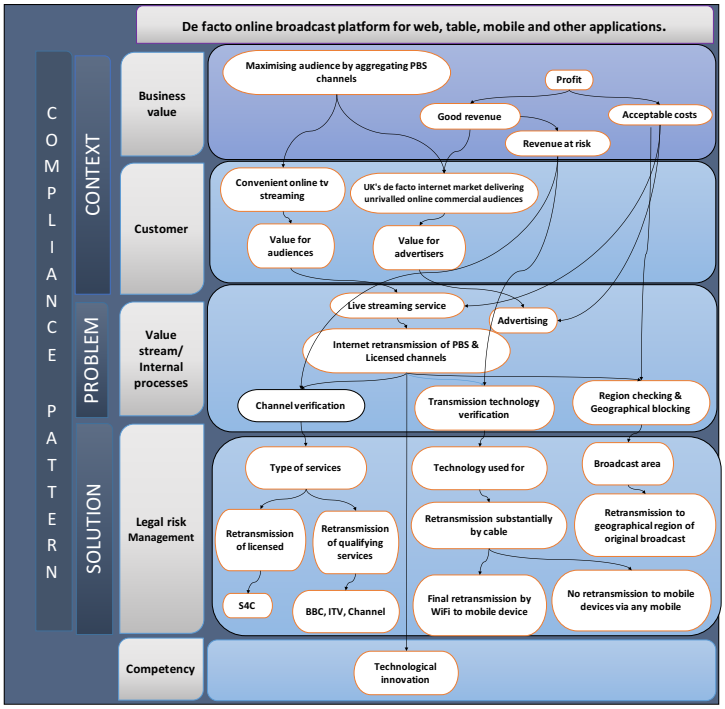

Figure 2: TVCatchup's strategy map

1. General rule premise: [Communication of film and broadcasts to the public] is restricted by a right belonging to [Broadcasters] under [s. 20(1)(b) and s.20(1)(c) of the CDPA].
2. Performance premise: To perform the activity in question, [TVC] must:
   (a) own the right;
   (b) be assigned to perform; or
   (c) be licensed to perform
3. Warrant: [TVC] infringes the right of Broadcasters if it performs the activity without authorization.
4. Conclusion: Therefore, [TVC] must own or obtain the right to perform the activity.
5. Else: [TVC] infringes the right of [Broadcasters].

4.3.2 Legal action

We simulate how the Broadcasters' would have sued with the framework's *argument from legal action*:

1. Established rule premise: Where a valid legal claim under [s. 20(1)(b) and s.20(1)(c) of the CDPA] exists, [Broadcasters] have a right to sue [TVC] under [s. 96(1) of the CDPA]

2. Remedies premise: [TVC] is potentially liable to [Broadcasters] under [s. 96(1) of the CDPA] for: [damages, injunctions, account of profits, impounding and disposition of infringing articles, costs and attorney's fees or criminal offences.
3. Violation premise: [TVC] violates [Broadcasters]' right under the section in question.
4. Conclusion: Therefore: [TVC] is potentially liable to [Broadcasters] for remedies

4.3.3 Exceptional case generation

TVC attacked the Broadcaster's main premise with an exception illustrated here with the framework's *argument from exceptional case*

1. Exception premise: If the case of [s. 73(2) and (3) of the CDPA] is an exception to the established rule under [s. 20(1)(b) and s.20(1)(c) of the CDPA], then the rule can be waived in that case.
2. The case cited is an exception.
3. Conclusion: Therefore, [TVC] is exempted from violation of [Broadcasters'] right under the established rule.
4. Critical questions:
   (a) Is the case of [s. 73(2) and (3) of the CDPA] a recognized type of exception? Yes, under the cited section of the law.
   (b) If it is not a recognized case, can evidence that the established rule does not apply to it be given? N/A
   (c) If it is a borderline case, can it be comparable cases be cited? N/A

4.4 Legal interpretation Stage

Having identified a plausible exception, the burden of prove shifts to the claimants to challenge it. The exception clause now frames the subject of interpretation.

2. The copyright in the broadcast is not infringed:
   (a) if the re-transmission by cable is in pursuance of a relevant requirement, or
   (b) if and to the extent that the broadcast is made for reception in the area in which it is re-transmitted by cable and forms part of a qualifying service.

The court found that the main issue was the scope allowed for retransmission of broadcasts by cable. The term 'cable' has competing definitions and the legal question raised was on which meaning allowed for an appropriate scope. The term has evolved over time from conventional cable to the present day fiber-optic cable. The former meaning, preferred by the broadcasters, has

a limited scope in line with it's dated enactment while the later, preferred by TVC, has a wider scope allowing for retransmission on the internet. The question raised initiates the interpretive process which, by applying interpretive arguments, explores the constitutive rules defining the term, their historical evolution, and balances necessary in a multi-jurisdictional setting.

4.5 Argumentation stage

4.5.1 Legal argument generation

Applying the forward argument scheme we develop 11 arguments used to clarify the meaning of the term cable. In order to illustrate the dialogue, we use the argumentation model in the *interpretive premise* to discuss them. To begin with, there is no strong indication of an argument from intention, so we proceed with the normal order of argumentation.

linguistic arguments

Interpretation has to start with ordinary or technical meanings within the text of the law. The court helps to establish: *There is no definition of cable for purposes of s. 73 CDPA therefore, the term can bear an ambulatory/movable meaning.* This calls for a clarifying definition which allows us to move to the second class of interpretive arguments.

Systemic arguments

The following definitions are derived with the help of systemic arguments:
Claimants: 'Cable' in s. 73 CDPA, refers only to dedicated cable networks operated by conventional cable programme providers. Retransmissions over the internet are therefore excluded. (Argument from contextual harmonization)

- Lack of definition shows UK parliament's intention that 'cable' should bear whatever meaning it had in EU law. (Argument from contextual harmonization)
- None of the relevant EU directives contains a definition of 'cable'. That concept must therefore be interpreted by taking account of its context and the objectives pursued by Directive 2001/29. (Argument from contextual harmonization)
- In EU directives 2001/29, 92/100, 93/83, 93/98/EEC, 'cable' means 'wire' but with limited scope i.e. as a subset of wire. (Argument from analogy)

Defendants: 'Cable' in s. 73 CDPA refers to fibre-optic cable.

- There is no reason why the cabling system inherent in the internet should not be regarded as cable for purposes of the defense. (Argument from analogy)

- The term 'cable', as used in Article 9 of Directive 2001/29, has a technologically neutral meaning. (Argument from principle)

Teleological-evaluative arguments

- **Claimants:** Directive 2001/29, was adopted with a view to responding, at EU level, to the issues of protection of copyright and related rights presented by the new services of the information society, made possible by the internet. (Argument from purpose)

- Article 9 of Directive 2001/29 is concerned with access to cable networks between providers in Directive 2002/19/EC (the Access Directive). Section 73(2)(b) and (3) of the CDPA, which provides for an exception to the exclusive right of communication enshrined in Article 3 of Directive 2001/29, cannot fall within Article 9 of that directive. (Argument from purpose)

Trans-categorical arguments

- **Claimants**: it must be assumed that the EU legislature was fully aware of the choice of the terminology. (Argument from principle)

- If it had intended to give the concept of 'cable' within the meaning of Directive 2001/29 a technologically neutral meaning, it must be considered that it would have chosen a more general concept, for example 'wire', or that it would at least have made clear that the concept of 'cable' included other technologies, such as transmission by means of the internet. (Argument from intention).

The argumentation model only permits the definition with the most weight across the three levels of argumentation. The broadcasters have more arguments and at all levels of argumentation compared to TVC which does not have arguments at the third and fourth levels. We therefore adopt the broadcasters' clarifying definition as the correct one. This corresponds with the definition that is likely to prevail at the UK Court of Appeal and which has been preferred by the Advocate General in his opinion delivered on 8th of September 2016. However, the CJEU is yet to deliver its judgment on the matter. With the prevailing position, the exception has to be rewritten as follows:

2. The copyright in the broadcast is not infringed:

(a) if the re-transmission by [traditional cable networks operated by conventional cable service providers] is in pursuance of a relevant requirement, or

(b) if and to the extent that the broadcast is made for reception in the area in which it is re-transmitted by [traditional cable networks operated by conventional cable service providers] and forms part of a qualifying service.

This also means that the original claim of infringement by the broadcasters stands as the following prescription: Communication of film and broadcasts to the public is restricted by a right belonging to the owner, asignee, or licensee of (b) a sound recording or film, or (c) a broadcast. We now apply the EARS to clarify prescription.

4.5.2 Ubiquitous Requirement: EU Law

The system shall verify that retransmission of a terrestrial channel by traditional cable or streaming on the internet, shall be individually authorized by the owner/author of the work in question.

Using, the *context-problem-solution* structure, we derive a compliance pattern as follows:
Context: TVC's technological resource has the capability to retransmit terrestrial channels to subscribers over the internet.
Problem: The retransmission capability may infringe Broadcasters right to broadcast and film copyright.
Solution: Ubiquitous requirement: The system shall verify that retransmission of a terrestrial channel by traditional cable or streaming on the internet, shall be individually authorized by the owner/author of the work in question.

This is the probable pattern based on the current trajectory of the case. Compare that to the current pattern we derived under the UK High Court case where TVC's exception is valid. This in fact, is a possible post-Brexit scenario.

Ubiquitous Requirements: UK Law

The system shall verify that:

- Retransmission by streaming over the internet shall be restricted to terrestrial public channels i.e. BBC, ITV, Channel 4, Channel 5.
- Retransmission shall be limited to the geographical area of the original broadcast.
- Retransmission to mobile devices via any mobile telephone network shall not be allowed.

Optional features:

Where final retransmission is by WiFi, the system is permitted to retransmit by mobile device.

4.6 Closing stage

The legal risk is managed by applying the compliance patterns to TVC's value model. SM goals represent desired changes to the current state of the business. These changes correspond to an evolution of the business that can be modeled by using two BC, one for the current version (before legal risk analysis) and another for the To-Be version (compliant to the generated patterns). For lack of space we just represent one set of BC and SM where we highlight the elements that are added to represent legal risk management. Summarising, in order explain the necessary conditions for compliance in a way that is much more intelligible to requirements engineers, business executives, business analysts and other stakeholders, we extend:

- the SM with an additional legal risk management perspective directly below the internal processes and map them onto their respective value streams. We then link those to the revenue-at-risk.
- the BC with extra activities (in the grey box) that have to be performed for the sake of compliance. We derive these activities from the compliance pattern and add them to the legal risk management perspective.

Apart from linking compliance activities to the revenue at risk in the SM, we also need to quantify them in the VDMBee business plan. This helps the business executives to understand the consequences and the future viability of the business model. Note that the EU pattern invalidates the current TVC business model which is operating under the UK regime. This would mean the total revenue is at risk. We implemented the TVC case on Value Management Platform from VDMBee which is the first implementation of VDML specification available. Details about the example implementation can be found at TVC business model.

An evaluation of our approach is ongoing with two startups in Turin, Italy and Nairobi, Kenya. The former's technology is applied to plan and coordinate civic events using open data. This raises data protection and privacy concerns, and the fair use exception to copyright infringement. The latter is mentioned in 2.3.3. This avails sufficient scenarios to generate a number of compliance patterns for testing the framework.

5 Conclusion

The foregoing work endeavors to reduce the complexity involved in interpreting legal provisions, using argumentation schemes. Steps have been outlined on how to isolate the issue to be interpreted and a model for applying interpretive arguments has been illustrated. Once the business context is modeled, using value modeling, abstract argumentation schemes are used to ensure (1) the relevant legal rules are identified (2) any ambiguities are resolved, and (3) the resulting outcome is applied. The result can be summarized in a compliance pattern, following a *context-problem-solution* format.

In this approach legal risk is modeled as value-at-risk in order to express its impact on the business model. The compliance patterns are designed to clarify the necessary conditions for compliance in a way that is accessible to system engineers, business executives, business analysts and other stakeholders. This aims to help them make informed decisions about the way to deal with legal risks. Should they revise the business model in accordance with the compliance pattern to mitigate the legal risk, or should they accept the risk and absorb the costs of non-compliance?

The approach is illustrated by a case study about a legal dispute in the area of copyright law. The case shows that the approach is expressive enough to capture the essence of the legal debate, and yet can be summarized in a compliance pattern. In particular the choice of using value modeling (VDML) to represent a business model, in order to represent the legal context and problem of a dispute, turns out to be fruitful. Value modeling can be linked to the Business Model Canvas, which is accessible and usable by the target audience of entrepreneurs. It is precise enough to capture legal choices, while avoiding the operational details of a business process model in a notation like BPMN.

Future work will focus on the formalization and streamlining of the argument schemes and the compliance pattern generation process. Additionally, more work is needed on a general method for quantification of legal risk, possibly in conjunction with either statistical or rule-based NLP methods (cf. [8] and [31]). So far we have only explored one model of reconciling interpretive arguments. How this model can interface with alternative models such as [3] needs to be investigated.

This work has been partially supported by the European Union's Horizon 2020 research and innovation programme under the Marie Skodowska-Curie grant agreement No 690974 for the project "MIREL: MIning and REasoning with Legal texts".

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